



**INF. 21**

16 novembre 2017

Original : EN

**RID :** 8<sup>e</sup> session du groupe de travail permanent de la Commission d'experts du RID  
(Utrecht, 20-24 novembre 2017)

**Objet :** Commentaires sur le document informel INF.18 (Suisse)

**Communication de la Belgique**

#### Table des matières

**Résumé analytique :** Explications supplémentaires sur les « très grands conteneurs-citernes »

**Décision à prendre :** /

**Documents de référence :** Document informel INF.18

1. Dans le document informel INF.18, la Suisse formule des questions concernant le nouveau type de conteneur-citerne mis au point par BASF et le constructeur belge de conteneurs-citernes van Hool.
2. Les réponses du constructeur sont reproduites ci-dessous (la numérotation correspond aux paragraphes dans le document informel INF.18) :
  1. *Les conteneurs-citernes de 45 et 52 pieds sont conçus selon les mêmes techniques que les conteneurs de 20, 30, 40 et 45 pieds déjà utilisés en transport combiné.*
  6. *Ces B-TC sont 100 % conformes au RID, à la CSC et aux règles de l'UIC et approuvés par les autorités compétentes.*
  7. *Certaines des prescriptions pour les conteneurs-citernes diffèrent de celles pour les wagons-citernes et les véhicules-citernes (ADR).*

*Pour information :*

- l'épaisseur équivalente pour l'acier de référence est de 6 mm pour les B-TC construits par VAN HOOL : il n'y a pas eu réduction de l'épaisseur selon le 6.8.2.1.19 du RID ;
- la fiche UIC 592 définit des essais dynamiques à 2g pour les UTI avec citernes et à 3g pour les caisses mobiles citernes destinées au transport de marchandises dangereuses ;
- la CSC ne prescrit pas d'essais dynamiques de résistance aux impacts longitudinaux ;
- les B-TC construits par VAN HOOL ont pour code-citerne L4BH ou L4DH ; ces groupes de matières autorisées ne sont pas concernés par la disposition spéciale TE 22.

8. Les B-TC sont **souvent** plus de deux fois plus grands que **la plupart** des conteneurs-citernes communément utilisés :

- VAN HOOL a produit plusieurs séries de conteneurs-citernes de 40 et 45 pieds, principalement pour les gaz liquéfiés et les poudres (non dangereuses) ;
- les wagons transportent souvent deux caisses mobiles de 7,82 m et 35 000 litres, soit une capacité de 70 000 litres par wagon.

10. VAN HOOL a réalisé trois séries d'essais pratiques pour trois différents modèles de B-TC, conformément à la CSC, à la fiche UIC 592 et à la norme ISO 1496-3.

*Ces essais pratiques incluent les essais dynamiques de résistance aux impacts longitudinaux à 3g selon la fiche UIC 592.*

*De plus, pour le dernier impact, les courbes SRC ont été créées à la vitesse maximale. La courbe SRC minimale selon la norme ISO 1496-3/Amdt.1 et le Manuel d'épreuves et de critères de l'ONU (5<sup>e</sup> édition révisée, partie IV, section 41) a également été dépassée à tous les points de la plage de fréquences.*

3. L'annexe au présent document comporte les rapports d'épreuve de ces trois séries d'essais pratiques (BVCT 15.07.0054/A, BVCT 17.07.0064/A et BVCT 17.07.0108/A).
4. Van Hool pourra si nécessaire communiquer d'autres documents techniques.



**TECHNICAL DEPARTMENT OF TRANSPORTATION**

**Examination report of the CSC/ISO 1496-3 prototype tests**

Characteristics of the prototype
Hoyer 119446
ADR/RID Tank container

Tested at: Lier- Belgium – Van Hool NV  
Görlitz – Germany – TÜV SÜD Rail GmbH

22/03/2017 to 31/03/2017

**Manufacturer** : Van Hool NV  
**Container Type** : TMI45-62/0  
**Kind of freight** : Liquids  
**List of drawings** : General drawing : 119446-006  
**ISO - type designation** : LMK2  
**Maximum gross weight** : 75000 kg  
**Tare** : 6200 kg  
**Maximum payload** : 68800 kg  
**Capacity** : Ca. 62500 L

<b>In attendance of</b>	- Daniel Zingelmann	TÜV SÜD Rail GmbH
	- Luc Borstlap	Van Hool
	- Bart Zuidhoek	Bureau Veritas
	- Koen De Gruyter	Bureau Veritas

Issued at Antwerp on the 25<sup>th</sup> of April 2017  
The surveyor,



B. ZUIDHOEK



- I. Condition of tank container on arrival at test centre (Checking of dimensions: p. 3)
- II. Aim of the test: To ascertain the performance of the tank container according to the following conditions:
- Loads in kilograms
  - Forces in daN (1kg = 0,98daN)
  - Dimensions in mm
  - Pressure in Bars

### **TESTS**

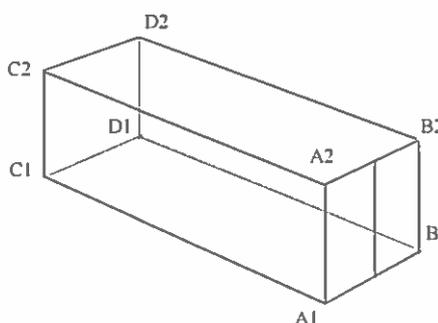
List of tests carried out	Order of tests	Comments	Page
- Dimensions check: Before test	1	Passed	3
After test	8	Passed	3
- Internal longitudinal restraint (dynamic)	2	Passed	4-5
- Stacking	3	Passed	6-7
- Transverse racking test	4	Passed	8
- Lifting from the four top corner fittings	5	Passed	9-10
- Longitudinal racking test	6	Passed	11

### **ANNEX**

Annex 1	General drawing	119446-006
Annex 2	Test program	119446-proefprogramma
Annex 3	Weight note	119446+21-Wiegeschein

### CHECK OF DIMENSIONS

Category		
Design dimensions		±
Length	13716	+0 -6
Width	2550	+0 -5
Height	2700	+0 -5



Temperature: Before: 20 °C      After: 20 °C

Position	Ref	Diagonals		
		Before	After	±Δ
End wall	A2 → B1			
	A1 → B2			
Front wall	C2 → D1			
	C1 → D2			
Side walls	A2 → C1			
	A1 → C2			
	B2 → D1			
	B1 → D2			
Floor	A1 → D1			
	B1 → C1			
Roof	A2 → D2			
	B2 → C2			

Position	Ref	Length		
		Before	After	±Δ
End wall	A1 → A2	2735	2734	1
	B1 → B2	2738	2737	1
	A1 → B1			
	A2 → B2			
Front wall	C1 → C2			
	D1 → D2			
	C1 → D1			
	C2 → D2			
Side walls	A1 → C1	12184	12185	1
	A2 → C2			
	B1 → D1	12191	12192	1
	B2 → D2			

- Dimensions to be taken at start and finish of the test program.
- Diagonal dimensions are not possible to measure.
- In particular cases, some dimensions may not be checked
- Add a complementary sheet to specify checks of temperature which might be applied.

No permanent deformations or abnormality which will render it unsuitable for use where found. The dimensional requirements affecting handling, securing and interchange where satisfied

Result:

Satisfactory





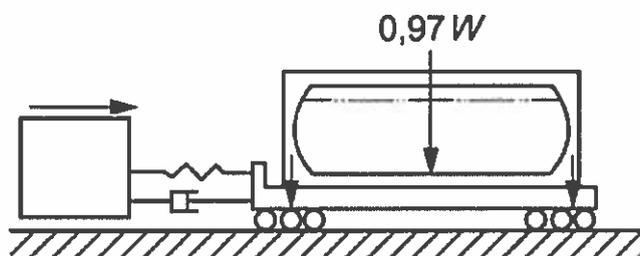
### ***DYNAMIC RESTRAINT TEST (IMPACT TEST)***

The container under test shall be filled with a quantity of water or any other non-pressurized product to approximately 97% volumetric capacity, ensuring that it is not pressurized during the test. However, if for reasons of overload it is not possible to fill to 97% of the capacity, then the test mass of the container (tare and product) shall be as close as possible to R. Measure and record the as-tested payload.

The container under test shall be placed on the test platform as close as possible to the impacting end, with the container end considered to be more vulnerable to impact damage facing the point of impact. All four bottom corners of the container shall be locked in position by means of corner fittings restraining movement in all directions.

Create an impact such that for a single impact the as tested SRS at both corner fittings equals or exceeds the minimum SRS curve\* at all frequencies within the range 3Hz to 100 Hz.

\* SRS curve according to ISO 1496-3 Amendment 1-2006 Figure D.1





**DYNAMIC RESTRAINT TEST (IMPACT TEST)**

R =	75000 kg
Theoretical load R-T =	68840 kg
Actual load =	38910 kg (32750 L Water)

Nr.	Speed of wagon	Change of diagonal length A-side	Change of diagonal length B-side	Curve above required SRS*	G forces Left / Right
1	4,3 km/h	0	0	No	-
2	12,4 km/h	0	0	No	5 / 5
3	12,7 km/h	0	0	Yes	5,69 / 5,73
4	12,9 km/h	0	0	Yes	5,93 / 5,92
		<b>Total change of length</b>	<b>Total change of length</b>		
		0	0		

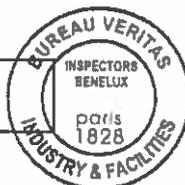
\* SRS curve according to ISO 1496-3 Amendment 1-2006

Comments: - The SRS curves for the highest impact speed were created in respect of an increased maximum gross weight of 75 000 kg and exceeded the minimum SRS curve in all points of the frequency range evaluated as well.  
 - Impact test approved for 75000 kg with use of safety factor 1,93 (5,79 G).  
 - For complete TÜV SUD rail report see; Project 717513886  
 Document 717513886\_Test report\_A  
 Dated 24/04/2017

No leakage or permanent deformations or abnormality which will render it unsuitable for use where found. The dimensional requirements affecting handling, securing and interchange where satisfied

Result:

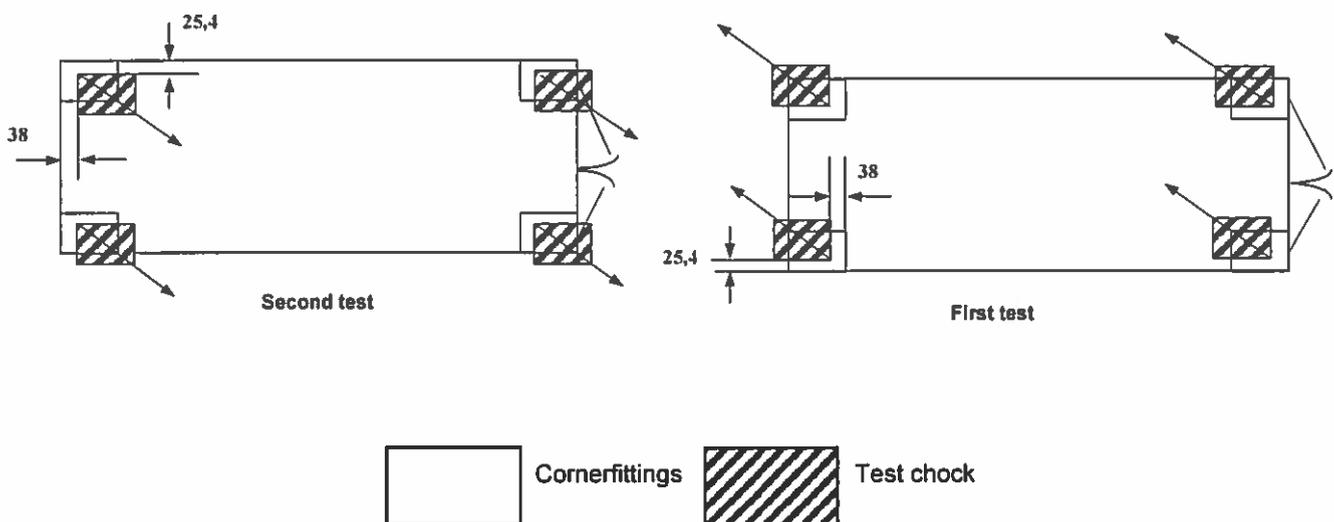
Satisfactory



### STACKING TEST (1/2)

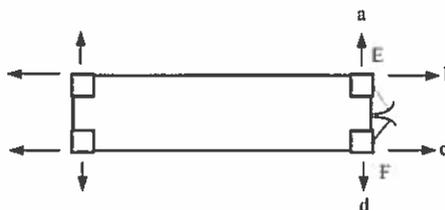
**Test method :**

The tank container will be placed on 4 level pads and subjected to vertical forces to all 4 corner fitting simultaneously, or to each pair of end fittings, at the appropriate level specified in table 2 of ISO 1496-3:1995(E). Each corner fitting or equivalent fitting shall be offset in the same direction by 25,4 mm laterally and 38 mm longitudinally. In the case of containers with identical ends, only one end needs to be tested.



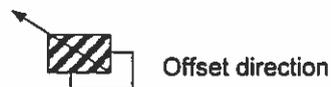
### STACKING TEST (2/2)

**Note:** Measurements will be taken at the centre of and at half the height of corner structures



Test load	Transverse corner structures deflections				Longitudinal corner structure deflections	
	a	b	c	d	E	F

1<sup>st</sup> test:



<b>Before test</b>					2738	2735
<b>During test</b>					2733	2732
<b>After test</b>					2737	2735

2<sup>nd</sup> test:



<b>Before test</b>					2737	2735
<b>During test</b>					2734	2732
<b>After test</b>					2739	2733
<b>Total deformation</b>					2	2

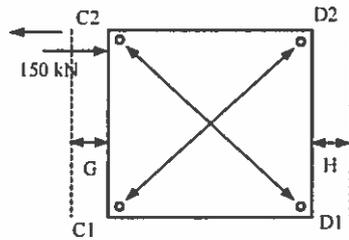
Comments: - Frame tested at stacking weight of 375000 kg  
- Visual inspection of the integrity performed of the tank container.

No permanent deformations or abnormality which will render it unsuitable for use where found. The dimensional requirements affecting handling, securing and interchange where satisfied

Result:

Satisfactory

**TRANSVERSE RACKING TEST**



FRONT END				
Force (kN)	Diagonal length			Limit
	G	H	$\Delta G+H$	
<b>Pushing</b>				
0	113	116	3	
112	106	112	6	
0	113	106		
<b>Pulling</b>				
0	113	106	3	
268	117	103	4	
<b>After tests</b>				
0	112	106	4	<b>10</b>

Comments: Only one end is tested due to identical end of the frame.

- No permanent deformations or abnormality which will render it unsuitable for use where found. The dimensional requirements affecting handling, securing and interchange where satisfied

Result:

Satisfactory





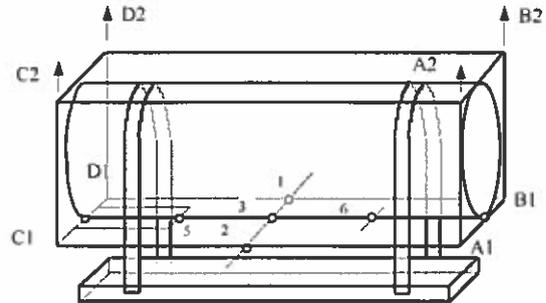
### ***LIFTING TEST FROM TOP CORNER FITTINGS (1/2)***

**Test method :**

The tank container under test is loaded to 2R, and is lifted by all four top corners in such a way that no significant acceleration or deceleration forces are applied.

The tank container shall be suspended for not less than 5 minutes and then lowered to the ground.

	<b>2R = 150000 kg</b>
Tare	6200 kg
Load (Water)	62500 kg
Extra Load (Belt)	81300 kg



**Lifting from top corner fittings (2/2)**

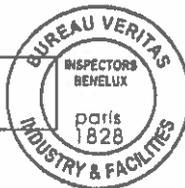
	<b>1</b>	<b>2</b>	<b>A1 - C1</b>	<b>B1 - D1</b>
<b>Empty</b>				
<b>Deflections measured before lifting (on pads)</b>				
<b>Deflections measured during lifting (At least 5 min)</b>				
<b>Deflections measured after lifting (on pads)</b>				
<b>Permanent deformation (Container unloaded)</b>				

Comments: Visual inspection of the integrity performed on the tank container.

- No leakage or permanent deformations or abnormality which will render it unsuitable for use where found. The dimensional requirements affecting handling, securing and interchange where satisfied

Result:

Satisfactory

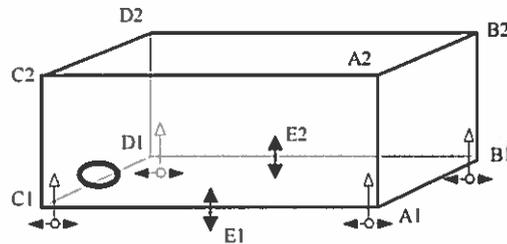


### RESTRAINT TEST (STATIC RESTRAINT)

#### Test method

The tank container, loaded with a uniformity distributed load to a total weight of R, shall be secured to rigid anchor points by the bottom securing points, at one end. A load equal to 2 x R (daN) shall be applied longitudinally to the tank container, through the bottom securing points, at the other end, first in compression, and then in tension. These forces will be held for at least 5 minutes.

	<b>R = 75000 kg</b>
Tare	6200 kg
Load (Water)	62500 kg
Extra Load (plates)	6300 kg



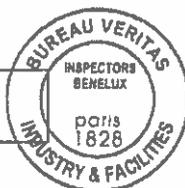
		Before test	During test	After test	Deformation
<b>Compression</b>	A1 → C1	12185	12179	12185	0
	B1 → D1	12192	12184	12190	1
	E1				
	E2				
<b>Tension</b>	A1 → C1	12184	12191	12185	1
	B1 → D1	12191	12197	12192	1
	E1				
	E2				

Comments: -

- No permanent deformations or abnormality which will render it unsuitable for use where found. The dimensional requirements affecting handling, securing and interchange where satisfied

Result:

Satisfactory



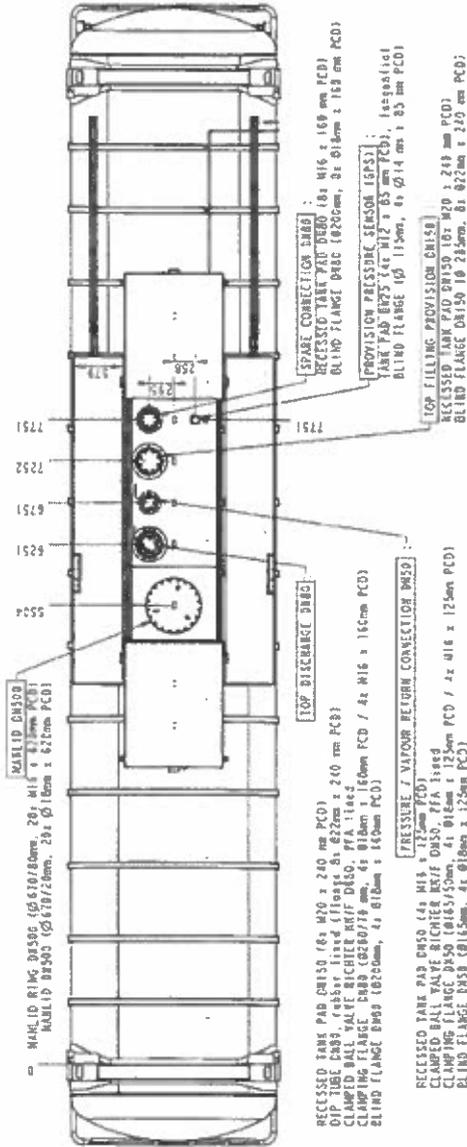
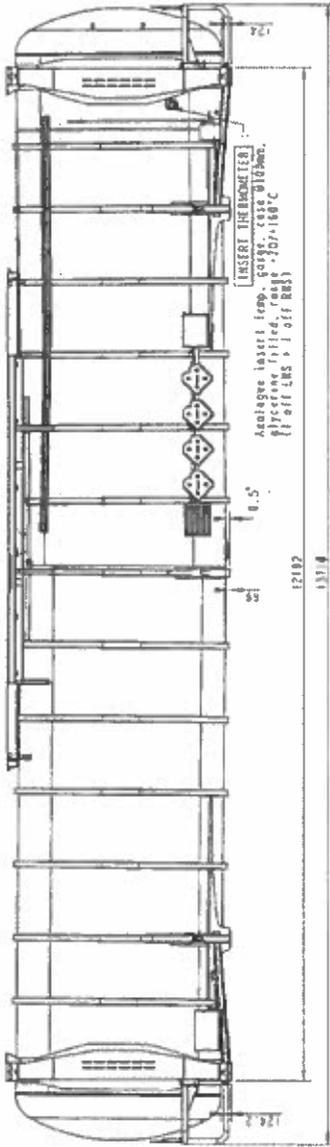
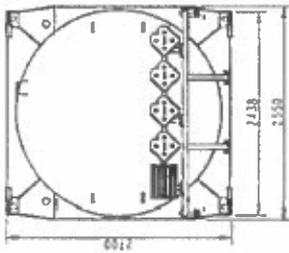


BUREAU VERITAS

ANNEX 1

Took heeft een V-vorm en ligt dus onder hoek in de kader, diameter is overal gelijk.

PNR:	119446-008
TJAZ:	AS WAGGON TEST JANG C
KL:	CUSTOMER DRAWING
ATK:	03001, JAFTEL, LARNO
BON:	LUCBOR
VAN:	000217
	119446-008



45°-fonteinleider tot HCl 37%

Capaciteit: 62.000l

Constructie: slijtsteels: steel 304

Rebberering: Chlorbutyl 70

ADSR/R10: LDH (topdischarge)

WAGP: 3 borstles

without baffles

without insulation

without heating

tare weight: ca 77001g



GEWICHTING: 6751.952

SCALE 231/000  
ELVB 3434 p.1



BUREAU  
VERITAS

## ANNEX 2

### HOYER 119466

### SO 7559

tarra 6200 kg  
inhoud 62500 L  
max. gross 75000 kg

### containertestbank

#### grote cylinders

grote diameter 200.03 mm  
kleine diameter 140.00 mm  
grote sekte 31425 mm<sup>2</sup>  
kleine sekte 16032 mm<sup>2</sup>  
slaglengte 160 mm

#### kleine horizontale cylinders portaal

grote diameter 130.8 mm  
kleine diameter 99.9 mm  
grote sekte 13439 mm<sup>2</sup>  
kleine sekte 5601 mm<sup>2</sup>  
slaglengte 360 mm

water  
balast

stacking 375000 kg  
per cilinder 168750 kg  
1655438 N  
sekte 31425 mm<sup>2</sup>  
druk 52.68 Mpa  
527 bar

leeg

racking drukken 150000 N  
sekte 13439 mm<sup>2</sup>  
druk 11.16 Mpa  
112 bar

racking trekken 150000 N  
sekte 5601 mm<sup>2</sup>  
druk 26.78 Mpa  
268 bar

leeg

heffen boven 150000 kg  
per cilinder (4x) 37500 kg  
367875 N  
sekte 16032 mm<sup>2</sup>  
druk 22.95 Mpa  
229 bar

vol  
+  
spanbanden over tank aan bank

trekken & drukken 75000 kg  
per cilinder 735750 N  
sekte 16032 mm<sup>2</sup>  
druk 45.89 Mpa  
459 bar

trekken & drukken 75000 kg  
per cilinder 735750 N  
sekte 31425 mm<sup>2</sup>  
druk 23.41 Mpa  
234 bar

vol

1 botsen 3g (GÖRLITZ)

vol

waterdrukproef 4.5 bar

vol



**ANNEX 3**

0011 8001 0115  
Bernard Van Hoolstraat 50  
B-2030 Leefdaal, België

Messnr.: 17.07.0064  
Wegcode: 4545

Wegcode: 110440

Transp. n.  
Inpakking:  
Rev.:

Bruto: 6160 kg  
6160  
6160 kg



**TECHNICAL DEPARTMENT OF TRANSPORTATION**

**Examination report of the CSC/ISO 1496-3 prototype tests**

<b>Characteristics of the prototype</b>
Hoyer 119483
ADR/RID Tank container

Tested at: Lier- Belgium – Van Hool NV  
Görlitz – Germany – TÜV SÜD Rail GmbH

11/07/2017 to 13/07/2017  
22/06/2017

**Manufacturer** : Van Hool NV  
**Container Type** : TMI45-54/0  
**Kind of freight** : Liquids  
**List of drawings** : General drawing: 119483-006  
**ISO - type designation** : LMK2  
**Maximum gross weight** : 75000 kg  
**Tare** : 6240 kg  
**Maximum payload** : 68760 kg  
**Capacity** : 53500 L

<b>In attendance of</b>	- Felix Bührdel	TÜV SÜD Rail GmbH
	- Luc Borstlap	Van Hool
	- Bart Zuidhoek	Bureau Veritas

Issued at Antwerp on the 14<sup>th</sup> of July 2017  
The surveyor,



B. ZUIDHOEK



- I. Condition of tank container on arrival at test centre (Checking of dimensions: p. 3)
- II. Aim of the test: To ascertain the performance of the tank container according to the following conditions:
- Loads in kilograms
  - Forces in daN (1kg = 0,98daN)
  - Dimensions in mm
  - Pressure in Bars

### TESTS

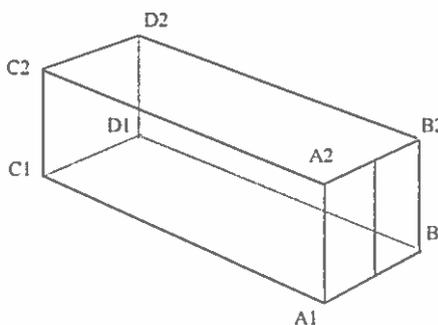
List of tests carried out	Order of tests	Comments	Page
- Dimensions check: Before test	1	Passed	3
	6	Passed	3
- Internal longitudinal restraint (dynamic)	2	Passed	4-5
- Stacking	3	Passed	6-7
- Lifting from the four top corner fittings	4	Passed	8
- Internal restraint test (longitudinal)	5	Passed	9

### ANNEX

Annex 1	General drawing	119483-006
Annex 2	Test program	119483-proefprogramma

### CHECK OF DIMENSIONS

Category		
Design dimensions		±
Length	13716	+0 -6
Width	2550	+0 -5
Height	2700	+0 -5



Temperature: Before: 20 °C After: 20 °C

Position	Ref	Diagonals		
		Before	After	±Δ
End wall	A2 → B1			
	A1 → B2			
Front wall	C2 → D1			
	C1 → D2			
Side walls	A2 → C1			
	A1 → C2			
	B2 → D1			
	B1 → D2			
Floor	A1 → D1			
	B1 → C1			
Roof	A2 → D2			
	B2 → C2			

Position	Ref	Length		
		Before	After	±Δ
End wall	A1 → A2	2700	2700	0
	B1 → B2	2700	2700	0
	A1 → B1			
	A2 → B2			
Front wall	C1 → C2			
	D1 → D2			
	C1 → D1			
	C2 → D2			
Side walls	A1 → C1	13716	13716	0
	A2 → C2			
	B1 → D1	13716	13716	0
	B2 → D2			

- Dimensions to be taken at start and finish of the test program.
- Diagonal dimensions are not possible to measure.
- In particular cases, some dimensions may not be checked
- Add a complementary sheet to specify checks of temperature which might be applied.

No permanent deformations or abnormality which will render it unsuitable for use where found. The dimensional requirements affecting handling, securing and interchange where satisfied

Result:

Satisfactory

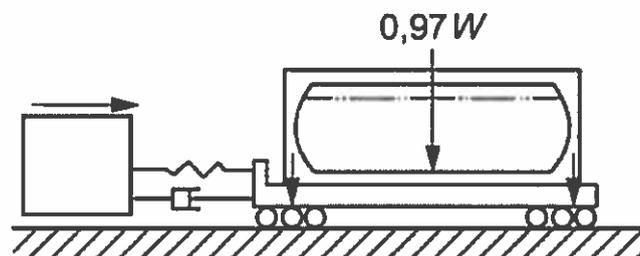


### ***DYNAMIC RESTRAINT TEST (IMPACT TEST)***

The test mass of the container shall be as close as possible to R. Measure and record the as-tested payload. The container under test shall be placed on the test platform as close as possible to the impacting end, with the container end considered to be more vulnerable to impact damage facing the point of impact. All four bottom corners of the container shall be locked in position by means of corner fittings restraining movement in all directions.

Create an impact such that for a single impact the as tested SRS at both corner fittings equals or exceeds the minimum SRS curve\* at all frequencies within the range 3Hz to 100 Hz.

\* SRS curve according to ISO 1496-3 Amendment 1-2006 Figure D.1





**DYNAMIC RESTRAINT TEST (IMPACT TEST)**

R =	75000 kg
Theoretical load R-T =	68760 kg
Actual load (filled with water) =	59740 kg

Nr.	Speed of wagon	Change of diagonal length A-side (mm)	Change of diagonal length B-side (mm)	Curve above required SRS* curve
1	4,5 km/h	0	0	No
2	10,6 km/h	0	0	No
3	12,2 km/h	0	0	No
4	12,7 km/h	0	0	Yes
		<b>Total change of length</b>	<b>Total change of length</b>	
		0	0	

\* SRS curve according to ISO 1496-3 Amendment 1-2006

Comments: - For complete TÜV SUD rail report see; Project 717514860  
 Document 717514860\_Test\_report\_A  
 Dated 30/06/2017

No leakage or permanent deformations or abnormality which will render it unsuitable for use where found.  
 The dimensional requirements affecting handling, securing and interchange where satisfied

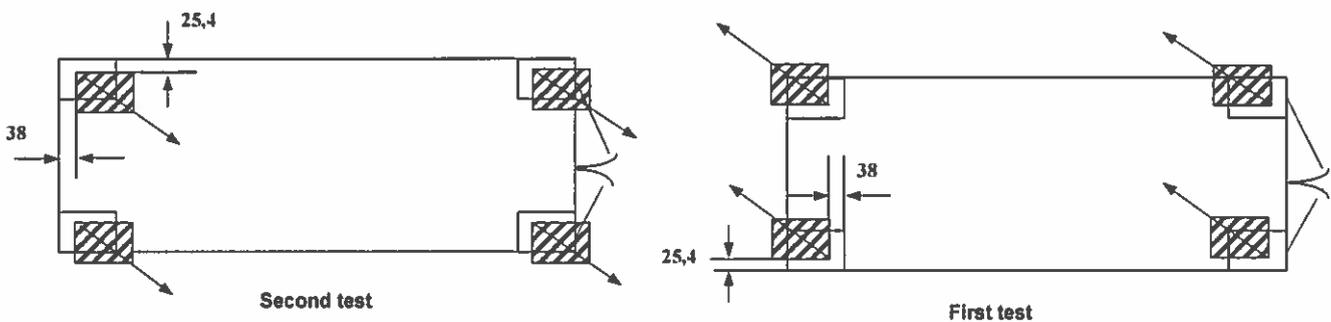
Result: Satisfactory



### STACKING TEST (1/2)

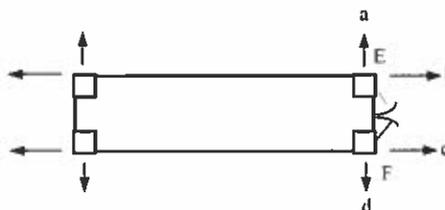
**Test method :**

The tank container will be placed on 4 level pads and subjected to vertical forces to all 4 corner fitting simultaneously, or to each pair of end fittings, at the appropriate level specified in table 2 of ISO 1496-3:1995(E). Each corner fitting or equivalent fitting shall be offset in the same direction by 25,4 mm laterally and 38 mm longitudinally. In the case of containers with identical ends, only one end needs to be tested.



### STACKING TEST (2/2)

**Note:** Measurements will be taken at the centre of and at half the height of corner structures



Test load	Transverse corner structures deflections				Longitudinal corner structure deflections	
	a	b	c	d	E	F

1<sup>st</sup> test:



<b>Before test</b>					2700	2700
<b>During test</b>					2699	2698
<b>After test</b>					2700	2700

2<sup>nd</sup> test:



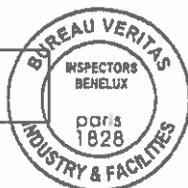
<b>Before test</b>					2700	2700
<b>During test</b>					2699	2698
<b>After test</b>					2700	2700
<b>Total deformation</b>					0	0

Comments: - Frame tested at stacking weight of 375000 kg  
- Visual inspection of the integrity performed of the tank container.

No permanent deformations or abnormality which will render it unsuitable for use where found. The dimensional requirements affecting handling, securing and interchange where satisfied

Result:

Satisfactory



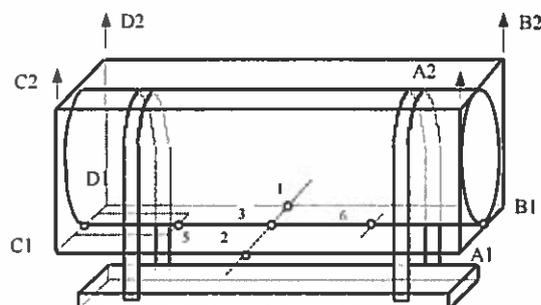
### LIFTING TEST FROM TOP CORNER FITTINGS (1/2)

Test method :

The tank container under test is loaded to 2R, and is lifted by all four top corners in such a way that no significant acceleration or deceleration forces are applied.

The tank container shall be suspended for not less than 5 minutes and then lowered to the ground.

	<b>2R = 150000 kg</b>
Tare	6240 kg
Filled with water	53500 kg
Extra Load (belt)	90260 kg



### Lifting from top corner fittings (2/2)

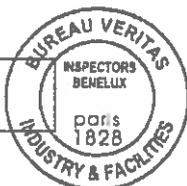
	1	2	A1 - C1	B1 - D1
Empty				
Deflections measured before lifting (on pads)				
Deflections measured during lifting (At least 5 min)				
Deflections measured after lifting (on pads)				
Permanent deformation (Container unloaded)				

Comments: Visual inspection of the integrity performed on the tank container.

- No leakage or permanent deformations or abnormality which will render it unsuitable for use where found.  
The dimensional requirements affecting handling, securing and interchange where satisfied

Result:

Satisfactory

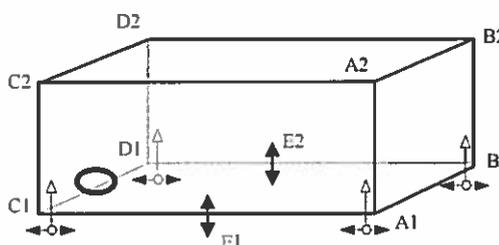


**RESTRAINT TEST (STATIC RESTRAINT)**

**Test method**

The tank container, loaded with a uniformity distributed load to a total weight of R, shall be secured to rigid anchor points by the bottom securing points, at one end. A load equal to 2 x R (daN) shall be applied longitudinally to the tank container, through the bottom securing points, at the other end, first in compression, and then in tension. These forces will be held for at least 5 minutes.

	<b>R = 75000 kg</b>
Tare	6240 kg
Filled with water	53500 kg
Extra Load (plates)	15500 kg



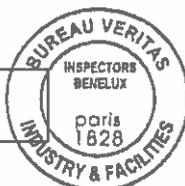
		Before test	During test	After test	Deformation
<b>Compression</b>	A1 → C1	13716	13711	13716	0
	B1 → D1	13716	13712	13716	0
	E1				
	E2				
<b>Tension</b>	A1 → C1	13716	13723	13716	0
	B1 → D1	13716	13723	13716	0
	E1				
	E2				

Comments: -

- No permanent deformations or abnormality which will render it unsuitable for use where found. The dimensional requirements affecting handling, securing and interchange where satisfied

Result:

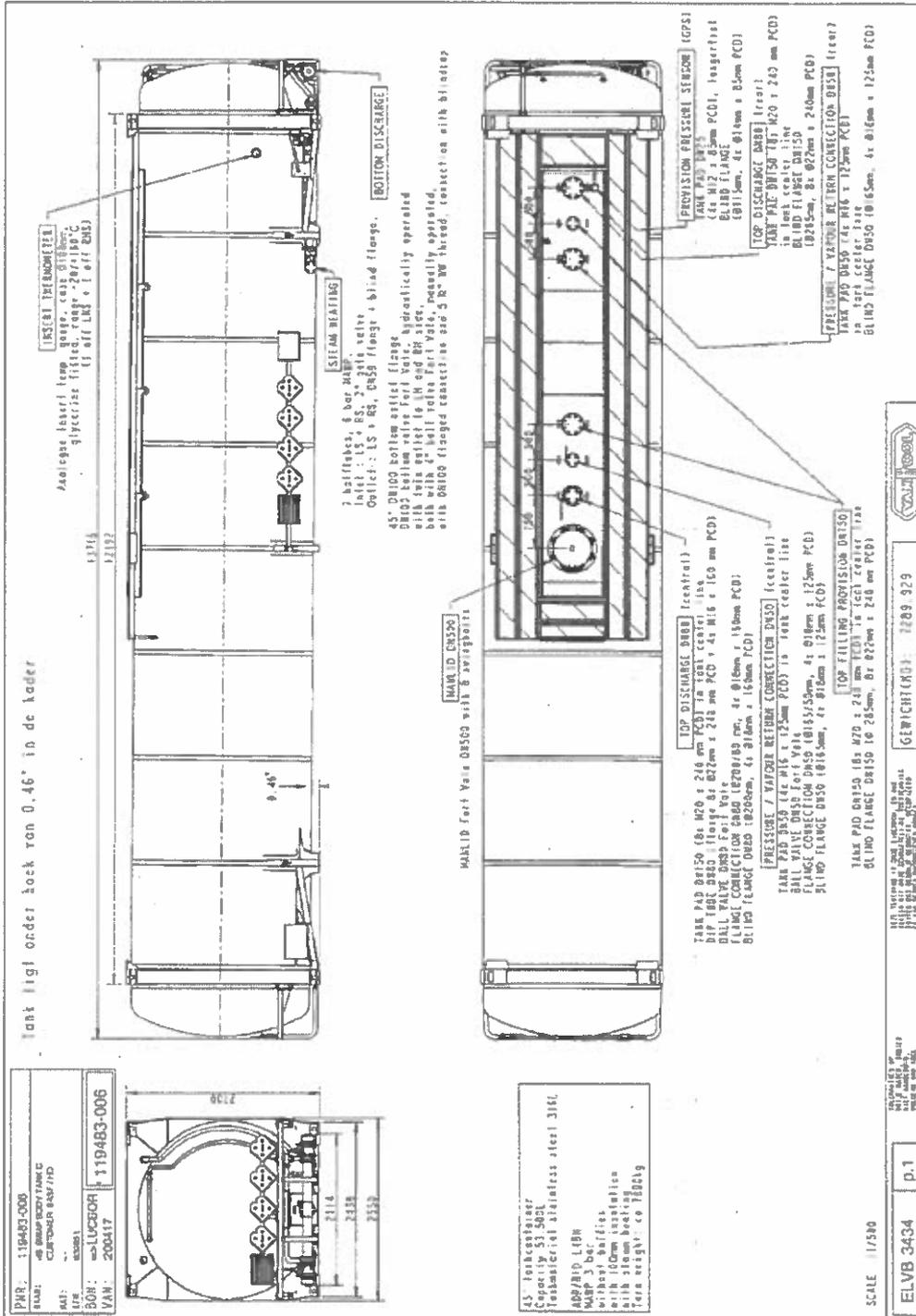
Satisfactory





BUREAU VERITAS

ANNEX 1





## ANNEX 2

<u>HOYER 119483</u>		<u>SO 7571</u>	<u>containertestbank</u>		
tarra	6000 kg		<u>grote cylinders</u>		
inhoud	53500 L		grote diameter	200.03 mm	
max. gross	75000 kg		kleine diameter	140.00 mm	
			grote sekte	31425 mm <sup>2</sup>	
			kleine sekte	16032 mm <sup>2</sup>	
			slaglengte	160 mm	
			<u>kleine horizontale cylinders portaal</u>		
			grote diameter	130.8 mm	
			kleine diameter	99.9 mm	
			grote sekte	13439 mm <sup>2</sup>	
			kleine sekte	5601 mm <sup>2</sup>	
			slaglengte	360 mm	water balast
2	stacking per cilinder	375000 kg 168750 kg 1655438 N			leeg
	sekte druk	31425 mm <sup>2</sup> 52.68 Mpa 527 bar			
3	heffen boven per cilinder (4x)	150000 kg 37500 kg 367875 N			vol + spanbanden over tank aan bank
	sekte druk	16032 mm <sup>2</sup> 22.95 Mpa 229 bar			
4	trekken & drukken per cilinder	75000 kg 735750 N	trekken & drukken per cilinder	75000 kg 735750 N	vol + 15500 kg
	sekte druk	16032 mm <sup>2</sup> 45.89 Mpa 459 bar	sekte druk	31425 mm <sup>2</sup> 23.41 Mpa 234 bar	
1	botsen 3g (GÖRLITZ)				vol
	waterdrukproef 4.5 bar				vol
LBL	21.04.'17				



**TECHNICAL DEPARTMENT OF TRANSPORTATION**

**Examination report of the CSC/ISO 1496-3 prototype tests**

Characteristics of the prototype
BASF 117992
ADR – RID L4BH

Tested at: Lier– Belgium – Van Hool NV  
Görlitz – Germany – TÜV SÜD Rail GmbH                      From 06/05/2015      To 13/05/2015

**Manufacturer** : Van Hool NV  
**Container Type** : TMIS45-63/0  
**Kind of freight** : Liquids  
**List of drawings** : General drawing : 117992-006 (26/02/2015)  
Frame drawing : 117992-1040 (26/02/2015)  
**ISO – type/size code** : LNK2  
**Maximum gross weight** : 75000 kg  
**Tare** : Bare : 7420 kg  
Insulated and equipped : / kg  
**Maximum payload** : / kg  
**Capacity** : 63000 L

<b>In attendance of</b>	- Daniel Zingelmann	TÜV SÜD Rail GmbH
	- Luc Borstlap	Van Hool
	- Koen De Gruyter	Bureau Veritas

Issued at Antwerp on the 4<sup>th</sup> of June 2015  
The surveyor,



  
De Gruyter Koen



- I. Condition of tank container on arrival at test centre (Checking of dimensions: p. 3)
- II. Aim of the test: To ascertain the performance of the tank container according to the following conditions:
- Loads in kilograms
  - Forces in daN (1kg = 0,98daN)
  - Dimensions in mm
  - Pressure in Bar

### TESTS

List of tests carried out	Order of tests	Comments	Page
- Dimensions check: Before test	1	Passed	3
After test	9	Passed	3
- Restraint test (static restraint)	4	Passed	6
- Transverse racking test	6	Passed	7
- Stacking	7	Passed	4-5
- Lifting from the four top corner fittings	5	Passed	9
- Internal lateral restraint	3	Passed	8
- Internal longitudinal restraint (dynamic)	2	Passed	10-11
- Hydraulic pressure test	8	Passed	12

### ANNEX

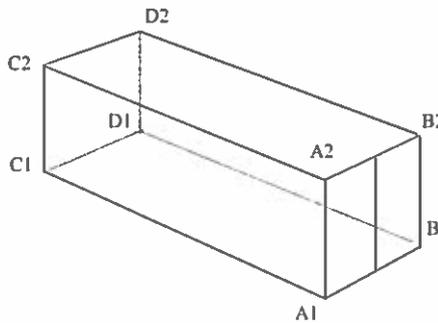
Annex 1	General drawing	117992-006 (26/02/2015)
Annex 2	Frame drawing	117992-1040 (26/02/2015)
Annex 3	Force calculation	BASF 117992 – SO7455



**BUREAU  
VERITAS**

### CHECK OF DIMENSIONS

Category		
Design dimensions		±
Length	13716	+0 -6
Width	2550	+0 -5
Height	2895	+0 -5



Temperature: Before: 15 °C      After: 15 °C

Position	Ref	Diagonals		
		Before	After	±Δ
End wall	A2 → B1			
	A1 → B2			
Front wall	C2 → D1			
	C1 → D2			
Side walls	A2 → C1			
	A1 → C2			
	B2 → D1			
	B1 → D2			
Floor	A1 → D1			
	B1 → C1			
Roof	A2 → D2			
	B2 → C2			

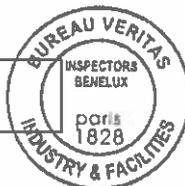
Position	Ref	Length		
		Before	After	±Δ
End wall	A1 → A2	2895	2895	0
	B1 → B2	2895	2895	0
	A1 → B1	2550	2550	0
	A2 → B2			
Front wall	C1 → C2	2895	2895	0
	D1 → D2	2895	2895	0
	C1 → D1	2550	2550	0
	C2 → D2			
Side walls	A1 → C1	13716	13716	0
	A2 → C2			
	B1 → D1	13716	13716	0
	B2 → D2			

- Dimensions to be taken at start and finish of the test program.
- All diagonals are taken from specified points at corner fittings.
- In particular cases, some dimensions may not be checked
- Add a complementary sheet to specify checks of temperature which might be applied.

No permanent deformations or abnormality which will render it unsuitable for use where found. The dimensional requirements affecting handling, securing and interchange where satisfied

Result:

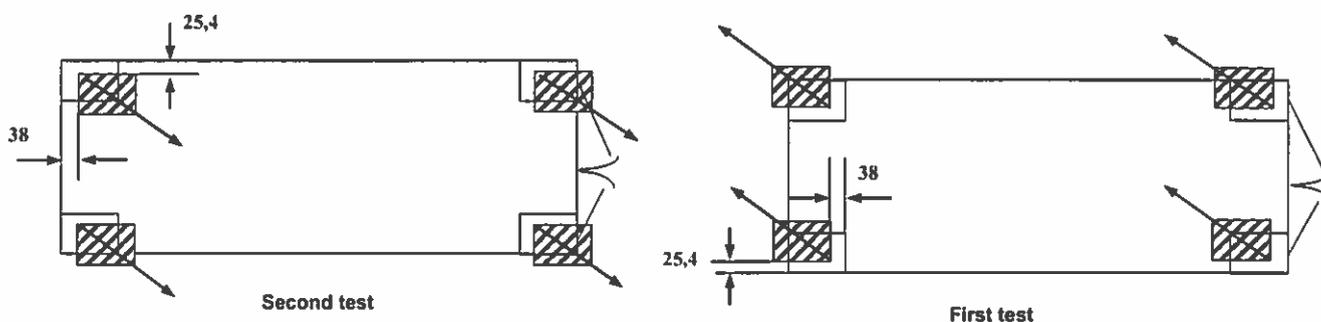
Satisfactory



### STACKING TEST (1/2)

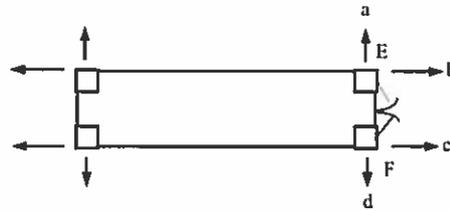
**Test method :**

The tank container will be placed on 4 level pads and subjected to vertical forces to all 4 corner fittings simultaneously, or to each pair of end fittings, at the appropriate level specified in table 2 of ISO 1496-3:1995(E). Each corner fitting or equivalent fitting shall be offset in the same direction by 25,4 mm laterally and 38 mm longitudinally. In the case of containers with identical ends, only one end needs to be tested.



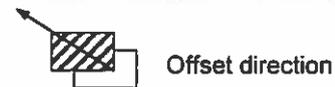
### STACKING TEST (2/2)

Note: Measurements will be taken at the centre of and at half the height of corner structures



Test load	Transverse corner structures deflections				Longitudinal corner structure deflections	
	a	b	c	d	E	F

1<sup>st</sup> test:



Before test					2895	2895
During test					2893	2894
After test					2895	2895

2<sup>nd</sup> test:



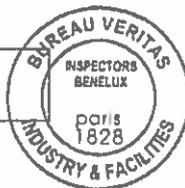
Before test					2895	2895
During test					2892	2993
After test					2894	2894
Total deformation					1	1

Comments: - Frame tested at stacking weight of 300.000 kg  
- Visual inspection of the integrity of the tank container performed.

No permanent deformations or abnormality which will render it unsuitable for use where found. The dimensional requirements affecting handling, securing and interchange where satisfied

Result:

Satisfactory

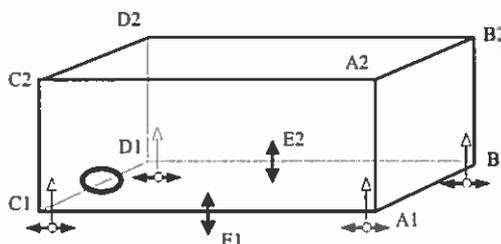


### RESTRAINT TEST (STATIC RESTRAINT)

#### Test method

The tank container, loaded with a uniformity distributed load to a total weight of R, shall be secured to rigid anchor points by the bottom securing points, at one end. A load equal to 2 x R (daN) shall be applied longitudinally to the tank container, through the bottom securing points, at the other end, first in compression, and then in tension. These forces will be held for at least 5 minutes.

R = 75000 kg  
 2R = 150000 kg



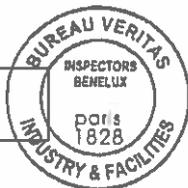
		Before test	During test	After test	Deformation
Compression	A1 → C1	12192	12182	12191	1
	B1 → D1	12189	12179	12189	0
	E1				
	E2				
Tension	A1 → C1	12191	12204	12192	1
	B1 → D1	12189	12200	12189	0
	E1				
	E2				

Comments: - Visual inspection of the integrity of the tank container performed.

No permanent deformations or abnormality which will render it unsuitable for use where found. The dimensional requirements affecting handling, securing and interchange where satisfied

Result:

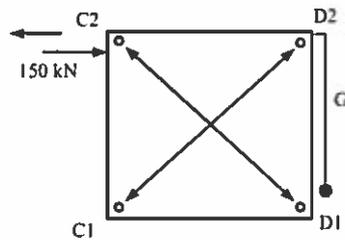
Satisfactory





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### TRANSVERSE RACKING TEST



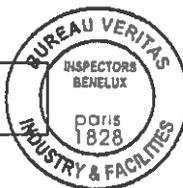
Force (kN)	
	<b>G</b>
<b>Pusing</b>	
0	52
150	56
0	52
<b>Pulling</b>	
0	52
150	49
<b>After test</b>	
0	52

Comments: - Only one end is tested due to identical end of the frame.  
- Measurement of diagonals not possible do to swap body. Measurements performed with plumb instead.

No permanent deformations or abnormality which will render it unsuitable for use where found. The dimensional requirements affecting handling, securing and interchange where satisfied

Result:

Satisfactory

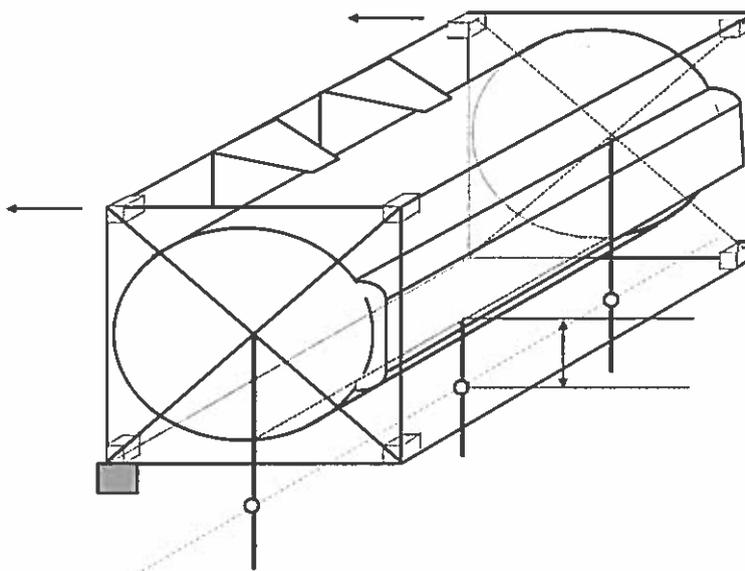


**LATERAL INERTIA TEST**

**Test method:**

The tank container under test shall be loaded to R. The tank container shall be positioned with its transverse axis vertical. It shall be held in this position by supports at the lower side of the base structure of the tank container acting through the bottom corner fittings in such a manner as to provide vertical and lateral securements. At the upper side of the base structure of the tank container, anchor devices acting through the bottom corner fittings shall be provided to give lateral restraint only. No securement shall be fixed to the top corner fittings. The tank container shall be held in this position for not less than 5 minutes.

	<b>R = 75000 kg</b>
Tare	7420 kg
Load (Water)	63000 kg
Extra Load (Metal plates)	4580 kg



Comments: Visual inspection of the integrity performed on the tank container.

- No leakage or permanent deformations or abnormality which will render it unsuitable for use where found. The dimensional requirements affecting handling, securing and interchange where satisfied.

Result:

Satisfactory



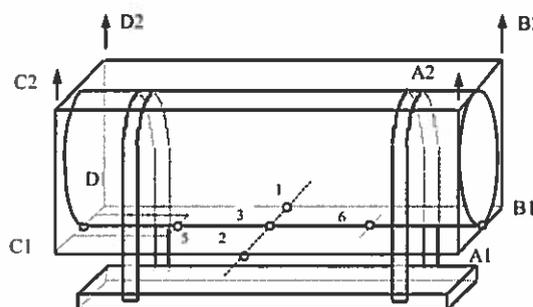
**LIFTING TEST FROM TOP CORNER FITTINGS**

Test method :

The tank container under test is loaded to 2R, and is lifted by all four top corners in such a way that no significant acceleration or deceleration forces are applied.

The tank container shall be suspended for not less than 5 minutes and then lowered to the ground.

	<b>2R = 150000 kg</b>
Tare	7420 kg
Load (Water)	63000 kg
Extra Load (Belt with steel I-profiles)	79580 kg



**Lifting from top corner fittings**

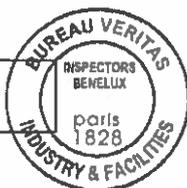
	1	2	A1 – C1	B1 – D1
Empty				
Deflections measured before lifting (on pads)				
Deflections measured during lifting (At least 5 min)				
Deflections measured after lifting (on pads)				
Permanent deformation (Container unloaded)				

Comments: Visual inspection of the integrity performed on the tank container.

- No leakage or permanent deformations or abnormality which will render it unsuitable for use where found. The dimensional requirements affecting handling, securing and interchange where satisfied

Result:

Satisfactory



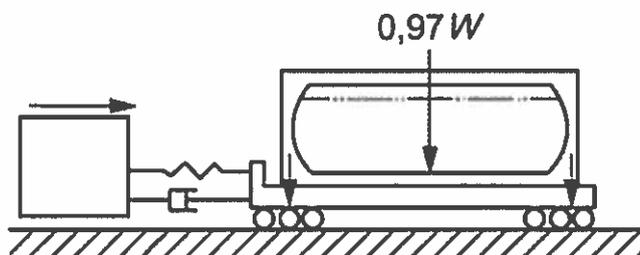
### ***DYNAMIC RESTRAINT TEST (IMPACT TEST)***

The container under test shall be filled with a quantity of water or any other non-pressurized product to approximately 97% volumetric capacity, ensuring that it is not pressurized during the test. However, if for reasons of overload it is not possible to fill to 97% of the capacity, then the test mass of the container (tare and product) shall be as close as possible to R. Measure and record the as-tested payload.

The container under test shall be placed on the test platform as close as possible to the impacting end, with the container end considered to be more vulnerable to impact damage facing the point of impact. All four bottom corners of the container shall be locked in position by means of corner fittings restraining movement in all directions.

Create an impact such that for a single impact the as tested SRS at both corner fittings equals or exceeds the minimum SRS curve\* at all frequencies within the range 3Hz to 100 Hz.

\* SRS curve according to ISO 1496-3 Amendment 1-2006 Figure D.1





**DYNAMIC RESTRAINT TEST (IMPACT TEST)**

R =	75000 kg
Theoretical load R-T =	67580 kg
Actual load =	40230 kg (97% Water)

Nr.	Speed of wagon	Change of diagonal length A-side	Change of diagonal length B-side	Left hand side Acceleration / SRS* curve	Right hand side Acceleration / SRS* curve
1	5,6 km/h	0	0	1,1G	1,1G
2	10,2 km/h	1	0	2,2G	2,1G
3	11,8 km/h	1	0	4,7G	4,5G
4	12,0 km/h	0	0	5,0G	4,6G
5	12,7 km/h	0	0	(Defect on accelerometer)	5,6G
6	12,4 km/h	0	0	5,4G / SRS Curve obtained	5,2G / SRS curve obtained
		<b>Total change of length</b>	<b>Total change of length</b>		
		2	0		

\* SRS curve according to ISO 1496-3 Amendment 1-2006

Comments:

- Do to correction factor an actual acceleration of 4,7G at both sides must be obtained to certify tank container with R = 75000kg for 3G.
- In test number 6 the actual acceleration force of 4,7G was obtained.
- In test number 6 the minimum SRS curve was obtained.
- Temporary partition in the tank containers is made.
- For complete TÜV SUD rail report see; Project 717510549  
 Document 15\_717510549\_Report\_A  
 Dated 11/05/2015

No leakage or permanent deformations or abnormality which will render it unsuitable for use where found.  
 The dimensional requirements affecting handling, securing and interchange where satisfied

Result:

Satisfactory





### HYDRAULIC PRESSURE TEST

**Test method :**

The tank shall be hydraulically tested.

If the liquid/gas tank is provided with compartments, in addition to hydraulic testing, each compartment shall be tested with the adjacent compartments empty and at atmospheric pressure. The test pressure shall be measured at the top of the tank or compartment with the tank container in its normal position. The test pressure shall be maintained for as long as is necessary to enable a complete examination of the tank and its fittings to be made, but in any case for not less than 30 min. Relief devices, where fitted, shall be rendered inoperative or removed for the purpose of this test. The pressure at which the tank is tested shall be selected with regard to the intended use of the tank, in accordance with the regulations applied by the competent authority.

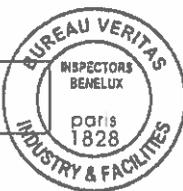
Test pressure	Duration	Test fluid	Temperature
6 bar	60 minutes	Water	15°C

Comments: Visual inspection of the integrity performed on the tank container.

- No leakage or permanent deformations or abnormality which will render it unsuitable for use where found.  
The dimensional requirements affecting handling, securing and interchange where satisfied

Result:

Satisfactory









BUREAU  
VERITAS

### ANNEX 3

**BASF : 117992**

**SO 7455**

**containertestbank**

tara 7420 kg  
inhoud 83000 kg  
max. gross 75000 kg

grote cilinders  
grote diameter 200.03 mm  
kleine diameter 140.00 mm  
grote sectie 31425 mm<sup>2</sup>  
kleine sectie 18032 mm<sup>2</sup>  
slaglengte 160 mm

kleine horizontale cilinders portaal

grote diameter 130.8 mm  
kleine diameter 89.9 mm  
grote sectie 13439 mm<sup>2</sup>  
kleine sectie 5601 mm<sup>2</sup>  
slaglengte 360 mm

water  
balast

stacking 300000 kg  
per cilinder 135000 kg  
1324350 N  
sectie 31425 mm<sup>2</sup>  
druk 42.14 Mpa  
421 bar

leeg

racking drukken 150000 N  
sectie 13439 mm<sup>2</sup>  
druk 11.18 Mpa  
112 bar

racking trekken 150000 N  
sectie 5601 mm<sup>2</sup>  
druk 26.78 Mpa  
268 bar

leeg

heffen boven 150000 kg  
per cilinder (4x) 37500 kg  
367875 N  
sectie 18032 mm<sup>2</sup>  
druk 22.95 Mpa  
229 bar

vol  
+  
spanbanden over tank aan bank

trekken & drukken 75000 kg  
per cilinder 735750 N  
sectie 18032 mm<sup>2</sup>  
druk 45.89 Mpa  
459 bar

trekken & drukken 75000 kg  
per cilinder 735750 N  
sectie 31425 mm<sup>2</sup>  
druk 23.41 Mpa  
234 bar

vol

2 kantelen 90° 75000 kg  
zadels R 1215 mm

vol  
+ 4580 kg

waterdrukproef 5 bar

vol

1 botsen 3g (GÖRLITZ)

vol 06.05.'15

LBL. 08.05.'15